AMENDMENTS TO THE CLAIMS

Favorable reconsideration of this application, in light of the preceding amendments and following remarks, is respectfully requested.

Listing of Claims

1. (Currently Amended) A method comprising:

obtaining a plurality of barcodes, at least one of the plurality of the barcodes comprising a permutation of two or more different types of tags branched to an organic molecule backbone, wherein each of the two or more different types of tags appear no more than once in the at least one of the plurality of barcodes;

binding the at least one of the plurality of the barcodes to a target;

and

detecting the at least one of the plurality of barcodes bound to the target,

wherein the organic molecule backbone comprises one or more branched nucleic acids and the at least one of the plurality of barcodes is detected by a technique selected from the group consisting of fluorescent spectroscopy, Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR), and surface plasmon resonance,

wherein the number of barcodes in the plurality of barcodes exceed the number of different types of tags branched to the plurality of barcodes.

2. (Original) The method of claim 1, wherein the backbone comprises at least one molecule selected from the group consisting of a nucleic acid, a peptide, a polysaccharide, a bio-polymer and a synthetic polymer.

3. (Original) The method of claim 2, wherein the nucleic acid is single-stranded DNA.

4. (Canceled)

5. (Original) The method of claim 1, wherein the tag is selected from the group consisting of nucleic acids, nucleotides, nucleotide analogs, base analogs, fluorescent dyes, peptides, amino acids, modified amino acids, organic moieties, Raman tags, quantum dots, carbon nanotubes, fullerenes, submicrometer metal particles, electron dense particles and crystalline particles.

6. (Cancelled)

7. (Previously Presented) The method of claim 1, wherein the branches are located at predetermined sites along the backbone.

8. (Cancelled)

9. (Original) The method of claim 1, wherein the barcode binds to the target via a probe moiety.

10. (Original) The method of claim 1, wherein distinguishable barcodes are generated by attachment of the same tag to different sites along the same backbone.

11. (Original) The method of claim 1, wherein the target is selected from the group consisting of a protein, a peptide, a glycoprotein, a lipoprotein, a prion, a nucleic acid, a polynucleotide, an oligonucleotide, a lipid, a fatty acid, a carbohydrate, a glycolipid, a phospholipid, a sphingolipid, a lipopolysaccharide, a polysaccharide, a eukaryotic cell, a prokaryotic cell, a bacterium, a phage, a virus and a pathogen.

12. (Currently Amended) A method comprising:

obtaining a plurality of nucleic acid templates, at least one of the nucleic acid templates comprising an organic molecule backbone comprising a container section and a probe section; and

hybridizing two or more tagged oligonucleotides to the container section of the plurality of nucleic acid templates to create a plurality of barcodes,

wherein the container section comprises a permutation of two or more different types of tags branched to the organic molecule backbone, wherein each of the two or more different types of tags appear no more than once in the container section, and

wherein the barcode is detected by a technique selected from the group consisting of fluorescent spectroscopy, Raman spectroscopy, Fourier transform infrared spectroscopy (FTIR), and surface plasmon resonance,

wherein the number of barcodes in the plurality of barcodes exceed the number of different types of tags branched to the plurality of barcodes.

13. (Original) The method of claim 12, further comprising binding the barcode to a target.

14. (Original) The method of claim 13, further comprising detecting the barcode bound to the target.

15.-34. (Canceled)

35. (Previously Presented) The method of claim 1, wherein the barcode is detected by Raman spectroscopy, and wherein the barcodes are proximately located to a signal enhancing surface comprising a salt selected from the group consisting of LiF, NaF, KF, LiCl, NaCl, LiBr, NaBr, LiI, NaI, and KI, the location sufficiently proximal to enhance the signal 2-100 fold.

36. (Previously Presented) The method of claim 12, wherein the barcode is detected by Raman spectroscopy, and wherein the barcodes are proximately located to a signal enhancing surface comprising a salt selected from the group consisting of LiF, NaF, KF, LiCl, NaCl, LiBr, NaBr, LiI, NaI, and KI, the location sufficiently proximal to enhance the signal 2-100 fold.

37. (Previously Presented) The method of claim 1, wherein the barcode is branched to the organic molecule backbone via a branch.

38. (Previously Presented) The method of claim 1, wherein the barcode is branched to the organic molecule backbone via a known oligonucleotide sequence hybridized to the organic molecule backbone.

39. (Previously Presented) The method of claim 1, wherein the barcode is a branched DNA barcode.

40. (Previously Presented) The method of claim 12, wherein the barcode is a branched DNA barcode.

41. (Previously Presented) The method of claim 1, further comprising binding at least one of the plurality of barcodes to a target.